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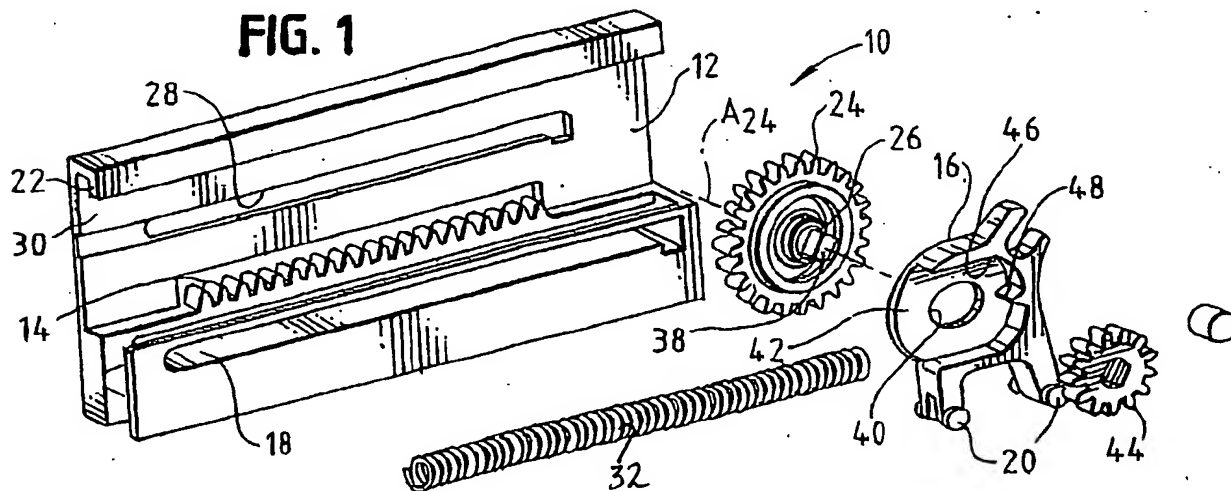
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(54) Slide mechanism

(57) A self-closing slide (10) is movable between an open position (Fig. 3) and a closed position (Fig. 2). The slide (10) includes a frame (12), a linear gear (14) on the frame (12) and a carriage (16) configured for movement along the frame (12). A biasing element (32) operably connects the frame (12) and the carriage (16) to bias the carriage (16) to the closed position. A pinion gear (24) is carried by the carriage (16) and is positioned for movement along the linear gear (14) with movement of the carriage (16) along the frame (12). A damper (44,48) is operably connected to the pinion gear (24) and to the carriage (16). An engagement gear (44) of the damper is movable between a first, engaged posi-

tion in which the engagement gear (44) engages a projection (48) and a second, disengaged position in which the engagement gear (44) disengages the projection (48). When the carriage (16) is moved from the closed position toward the open position, the engagement gear (44) is in the second, disengaged position to disengage the damper so that the pinion gear (24) rotates freely. When the carriage (16) is moved from the open position toward the closed position, the engagement gear (44) is in the first, engaged position to engage the projection (48), damping rotation of the pinion gear (24) along the linear gear (14) and hence damping movement of the carriage (16).

FIG. 1



shown in the closed or relaxed state with the damper in the engaged condition; and
FIG. 3 is a perspective view of the slide mechanism shown in the open or tensioned state with the damper in the disengaged condition.

[0017] Referring now to the figures and in particular, to FIG. 1, there is shown a self-closing slide mechanism 10 embodying the principles of the present invention. The present slide mechanism 10 captures an integral damper in a carrier mechanism such that the damper is engaged and operational when the drawer or the like is moved in one direction, such as pushed closed, but is disengaged and non-operational when the drawer is moved toward the other direction, such as toward an open position.

[0018] The self-closing slide 10 includes a frame 12 having a linear rack gear 14 thereon. As illustrated, the rack gear 14 can be formed integral with the frame 12. Alternately, although not shown, the rack gear can be mounted to the frame. A carriage 16 is movable adjacent the rack gear 14. In a preferred arrangement, the carriage 16 is mounted to the frame 12 for sliding engagement with the frame 12. More preferred, the carriage 16 is secured to the frame 12 for sliding therealong. In an exemplary slide 10, the frame 12 includes slots 18 formed therein that enclose guide or feet portions 20 of the carriage 16. In such an arrangement, the carriage 16 is prevented from inadvertently dislodging from, or jamming in, the frame 12. In the exemplary slide 10, the slots 18 are formed in a lower portion side portion of the frame 12. The frame 12 can also include a depending lip 22 that extends downwardly, toward the rack gear 14.

[0019] A pinion gear 24 is mounted to the carriage 16, and is positioned to traverse back and forth along the frame 12, engaging or meshing with the rack gear 14. The pinion gear 24 is mounted to a damper 26 that is positioned on the rotational axis A_{24} of the pinion gear 24. That is, the pinion gear 24 rotates about the damper 26. Alternatively, the pinion gear 24 can be molded as part of the damper housing. The damper 26, as will be discussed below, when engaged, dampens or provides resistance to movement of the pinion gear 24 along the rack gear 14 by resisting rotation of the pinion gear 24, similar to a braking function. For purposes of securing the carriage 16 (and pinion gear 24) to the frame 12, a pin or shaft portion (not shown) can extend through an opening 28 in a rear wall 30 of the frame 12. In addition, the pinion gear 24 can be captured between the rack gear 14 and the frame lip 22 to facilitate securing the gear 24 to the frame 12.

[0020] An extension spring 32 is attached at one end to the carriage 16 and at another end to the frame 12. The force exerted by the spring 32 pulls the carriage 16 toward the closed position (FIG. 2). This provides the closing assist, or self-closing feature of the slide 10.

[0021] The damper 26, to which the pinion gear 24 is mounted, is operably connected to the carriage 16 such

that it rotates freely with the pinion gear 24 in one direction (moving from the closed position to the open position as indicated by the directional arrow 34 in FIG. 2), but is restrained from rotation in an opposite direction (moving from the open position to the closed position as indicated by the directional arrow 36 in FIG. 3). In this configuration, the damper 26 is non-operational or non-functional when the drawer (or the like) is pulled out to the open position, but provides a damping effect when the drawer is returned to the closed position.

[0022] In a present embodiment, this one way damping action is provided by a moving gear mounting assembly. Referring to FIG. 1, the damper 26 includes a keyed shaft 38 that extends through an elongated slot 40 in a wall 42 of the carriage 16. An engagement gear 44 (keyed for mating engagement with the damper shaft 38) is connected to the damper shaft 38, on the opposite side of the carriage wall 42 from the pinion gear 24. In such an arrangement, the engagement gear 24 and pinion gear 44 are thus secured to the carriage wall 42. In that the slot 40 is elongated, a common rotational axis A_c of the pinion gear 24/damper 26/engagement gear 44, as an assembly, moves relative to its mounting in the carriage 16.

[0023] A recess 46 is formed in the wall 42 of the carriage 16 (on that side of the carriage 16 onto which the engagement gear 44 is fitted). The recess 46 essentially provides a captive region for the engagement gear 44. It is within this captive region 46 that the engagement gear 44 moves to effect the one-way damping action. To this end, at least one tooth or cog 48 extends into the captive region 46 that is configured to engage the engagement gear 44. In that the engagement gear 44 moves along the slotted opening 40 in the carriage wall 42, the engagement gear 44 moves into and out of engagement with the tooth 48. When the engagement gear 44 is engaged with the tooth 48, as illustrated in FIG. 2, the damper 26 is engaged which provides damping effect on rotation of the pinion gear 24.

[0024] Conversely, when the pinion gear 24/damper 26/engagement gear 44 assembly shifts away from the tooth 48 (as illustrated in FIG. 3), the engagement gear 44 is disengaged from the tooth 48. This disengages the damper 26 and allows the assembly to rotate freely in the slot 40. Thus, there is no damping action on rotation of the pinion gear 24.

[0025] In an exemplary application, the self-closing slide mechanism 10 is attached to a drawer slide. A pin or the like (such as the exemplary pin 50) can be fitted into a retainer 52 in the carriage and can be used to selectively engage the carriage 16 with the drawer runner slide (not shown). Detents 54 can be formed in the frame slots 18 into which the carriage feet 20 are positioned. In addition, capture pins, extensions or the like 56, can engage the frame slot detents 54 to hold the carriage 16 in the open position.

[0026] In operation, from an open position, as a drawer or the like is pushed closed, the pin 50 on the drawer

the track (18) includes a detent (54) in an end thereof for locking the carriage (16) at the detent (54) and so in the open position.

8. A self-closing slide according to claim 6 or 7, wherein the track includes a slot (18) in the frame (12) and wherein the carriage (16) includes a guide portion (20) for receipt in the slot (18) as the mating guide.
9. A self-closing slide according to any one of the preceding claims, wherein the biasing element includes a spring (32) operably connecting the carriage (16) to the frame (12) for urging the carriage (16) towards the closed position.

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	WO 01 50916 A (GASSER INGO ;BLUM GMBH JULIUS (AT)) 19 July 2001 (2001-07-19) * abstract; figures *	1-9	A47B88/04
A	DE 200 06 068 U (HUELSTA WERKE HUELS KG) 7 September 2000 (2000-09-07) * page 7, line 19 - line 35 * * figure 1 *	1-9	
A	DE 199 09 734 A (BULTHAUP GMBH & CO) 7 September 2000 (2000-09-07) * abstract; figures *	1-9	
P,X	US 2002/096405 A1 (GASSER INGO) 25 July 2002 (2002-07-25) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A47B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 July 2003	Examiner Ottesen, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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